



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/830,119 | 04/23/2004 | Sang-jin Park | 249/464 | 9008 |

7590 09/22/2005

LEE & STERBA, P.C.
1101 Wilson Boulevard
Suite 2000
Arlington, VA 22209

EXAMINER

TRAN, MAI HUONG C

ART UNIT PAPER NUMBER

2818

DATE MAILED: 09/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/830,119

Applicant(s)

PARK ET AL.

Examiner

Mai-Huong Tran

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 8-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>8/8/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restriction

Application's election without traverse of Group I (Claims 1-7) drawn to a semiconductor device is acknowledged for prosecution in the subject application. Accordingly, claims 8-21 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Applicants have the right to file a divisional application covering the subject matter of the non-elected claims.

Specification

The specification is objected to for the following reasons.

On page 14, [0053], line 5, the specification includes incorrect reference sign "MTJ layer 6". It should be "MTJ layer 62". Correction is required.

Claim Rejections - 35 U.S.C. § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Background of the Invention in view of U.S. Patent No. 6,855,563 to Motoyoshi.

Regarding to claim 1, Background of the Invention discloses a magnetic random access memory (MRAM) having a transistor T and a magnetic tunneling junction (MTJ) layer S in a unit cell, the MTJ layer comprising a lower magnetic layer S1, a tunneling oxide layer S2 and an upper magnetic layer S3 (fig. 3).

Background of the Invention does not disclose an oxidation preventing layer wherein the lower magnetic layer, the oxidation preventing layer, the tunneling oxide layer, and the upper magnetic layer are sequentially stacked. However, Motoyoshi teaches an oxidation preventing layer 135 wherein the lower magnetic layer, the oxidation preventing layer, the tunneling oxide layer, and the upper magnetic layer are sequentially stacked (col. 8, lines 17-46).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide an MRAM with a degree of integration higher than those of the conventional MRAMs (col. 6, lines 6-8).

Regarding to claim 2, Motoyoshi discloses the claimed invention except for the MRAM wherein the oxidation preventing layer is formed of an AlO_x layer.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the MRAM wherein the oxidation preventing layer is formed of an AlO_x layer, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding to claim 3, Motoyoshi discloses the MRAM wherein the tunneling oxide layer is formed of one of an AlO_x layer, an $\text{Al}_x\text{Hf}_{1-x}\text{O}_y$ layer, and a Fe_3O_4 layer (col. 8, line 20-22).

Regarding to claim 4, Motoyoshi discloses the MRAM wherein the tunneling oxide layer has a repeating structure of sequentially stacked atomic layers (fig. 3B).

Regarding to claim 5, Motoyoshi discloses the MRAM wherein the tunneling oxide layer is formed of one of an AlO_x layer, an $\text{Al}_x\text{Hf}_{1-x}\text{O}_y$ layer, and a Fe_3O_4 layer (col. 8, line 20-22).

Regarding to claim 6, Motoyoshi discloses the MRAM wherein one of the upper and lower magnetic layers includes a free ferromagnetic layer (col. 3, lines 24-30).

Regarding to claim 7, Background of the invention discloses the MRAM wherein a data line is formed in the MRAM to be a magnetic field generating element for writing data to the MTJ layer (fig. 1).

Conclusion

Any inquiry concerning this communication on earlier communications from the examiner should be directed to Mai-Huong Tran, (571) 272-1796. The examiner can normally be reached on Monday-Thursday from 8:00 AM to 6:30 PM. The examiner's supervisor, David Nelms can be reached on (571) 272-1787.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR, Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Mai-Huong Tran